

RECONSTRUCTING PROTO KENYAH PRONOUNS AND THE DEVELOPMENT OF A TRUE
FIVE NUMBER SYSTEM

Alexander D. Smith

ABSTRACT

Topologists have in the past claimed that a 15 person system, with singular, dual, trial/paucal, plural, first person inclusive/exclusive, second person, and third person, is the maximum system allowed for systems of personal pronouns in the world's languages. These claims have been interpreted formally in feature systems that restrict the possible number distinctions in pronoun systems to four (singular, dual, trial or paucal, and plural). Within the past fifteen years more comprehensive works on number have published documented five number systems in widely available formats. Interestingly, all of the languages used to exemplify five number systems are from the Oceanic subgroup of Austronesian. However, complex number systems, including a five number pronoun system, have developed independently in central Borneo. Although Blust has made this data widely available, central Borneo remains untouched in general discussions of number. The Kenyah languages form a primary branch of the North Sarawak subgroup, located in central Borneo in both Sarawak (Malaysia) and Indonesia. A number of typologically rare features are present in Kenyah, including a pronoun system that includes 5 distinct numbers. Comparative data shows that a five number system can be reconstructed for Proto-Kenyah. This challenges both typological and formal descriptions of number.

1 INTRODUCTION. Number¹ in pronoun systems is described formally as a product of the interaction of features. At most, the formal literature allows for three features which interact to give a maximum of four numbers in the world's languages: singular, dual, trial/paucal, and plural (Harley and Ritter 2002). More restrictive feature based accounts of number allow for only two features, [singular, plural] (Adger 2003), or a single feature, [\pm plural] (Anderson 1992). The goal of such restricted feature sets is to constrain theory to represent only those languages which have attested attributes. From a typological perspective, it has been claimed that a 15 person system, with singular, dual, trial/paucal, plural, first person inclusive/exclusive, second person, and third person, is the maximum system allowed in the world's languages (Ingram 1978). Within the past fifteen years more comprehensive works on number such as Corbett (2000) and Cysouw (2003) have published documented five number systems in widely available formats, yet formal systems of features still insist on a four number maximum. Interestingly, all of the languages used to exemplify five number systems so far are from the Oceanic subgroup of Austronesian. However, complex number systems, including a five number pronoun system, have developed independently in central Borneo. Although Blust (2003, 2013) has made this data widely available, central Borneo remains untouched in general discussions of number.

In light of this, the aim of this paper is to review the theoretical predictions and constraints on number systems in the world's languages, while bringing special attention to the presence of a complex number system outside the Oceanic subgroup. To achieve this, I will describe in detail the pronominal system of Kenyah and its numerous dialects, and use the analysis to reconstruct a five number system to the level of Proto-Kenyah (PKEN). The

¹ In this paper, I use the term NUMBER to refer only to pronominal number. It is not meant to refer to grammatical number or agreement. None of the languages in this paper indicate number of objects (as in book/books).

reconstructed pronominal system makes at least 19 distinctions, including numeral distinctions of singular, dual, trial, quadral, and plural, as well as an inclusive/exclusive distinction. This reconstructed system challenges many of the more restrictive theoretical claims of number.

2 FEATURE REPRESENTATIONS OF NUMBER. Theoretical accounts of number systems generally operate under two principles. 1) number systems are best represented as an interaction of features. Typically, these features incorporate [singular] and [plural]², and in some cases additional features are added to allow for a greater number of contrasts. 2) theoretical accounts of number systems constrain number to an absolute maximum. That is, there is a limit to the number of distinctions that can be made in number systems, and this distinction is a result of the interaction of features. Different theoretical accounts of number constrain the possible distinctions to varying degrees. The remainder of this section examines three different feature proposals, a one feature system, a two feature system, and a three feature system.

2.1 The One Feature System. A one feature number system is quite restrictive. In application, it can create no more than two numbers (singular and plural). Anderson (1992) provides just a system, with the number feature [\pm plural]. A theoretical framework with only one number feature fails almost immediately in accounting for empirical data. The data set used in Harley and Ritter (2002:497), for example, contains 91 languages. 18 of those languages (20%) have three numbers, a singular, dual, and plural. Three additional languages have four numbers. With Anderson's [\pm plural] feature, only three fourths of the languages in Harley and Ritter's data can be formally explained.

2.2 The Two Feature System. The two number system provides a fairly restrictive feature set, but one which allows for a dual number. Adger (2003) provides an argument for a three number system as a part of a much larger work on the Minimalist Program. Although this work is introductory, it presents a number of important assumptions about the nature of number systems including a claim that linguists "simply don't find languages which distinguish four varieties of number feature, and treat them all on an equal basis" (Adger 2003:22).

His system incorporates two features, singular and plural. These features have three possible arrangements, shown below:

Singular:	[singular]
Dual:	[singular, plural]
Plural:	[plural]

The features are monovalent. That is, they only appear with a positive value. Thus, the singular is read as [+singular], not [+singular, -plural]. Monovalency rules out an otherwise predicted fourth arrangement, [-singular, -plural]. Because of this, a monovalent two feature system has only three possible arrangements. Adger thus makes the specific prediction that languages are not capable of forming higher number distinctions. The reason for this lack of ability is formal. Note

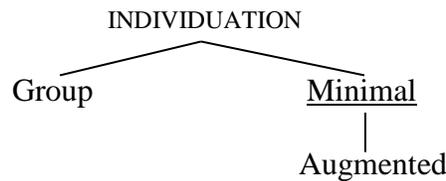
² All works on number include some sort of singular and plural feature, though the names of these features varies, as do details of their function.

also that this feature system lacks internal structure. Number in this view is composed of feature “bundles” rather than feature hierarchies³.

2.3 The Three Feature System. Harley and Ritter (2002) propose a three feature system, organized in a hierarchical structure which generates four numbers. Singular, dual, and plural are formed in the same manner as Adger’s system, albeit with different labels. A third feature, [augmented], is added to generate a fourth number. The three feature geometry is monovalent, like Adger’s feature bundles, so there are no negative feature values.

Singular:	[Minimal]
Plural	[Group]
Dual	[Minimal, Group]
Paucal	[Minimal, Group, Augmented]

The features are implicational. Activation of the feature [augmented] implies activation of the feature [minimal]. Thus, the internal structure is hierarchical, and is represented with a featural geometry. The morphological feature geometry takes its inspiration from phonological feature geometries (see Clements 1985). In Harley and Ritter’s geometry, the INDIVIDUATION node is responsible for number. Harley and Ritter provide a tree representation of their feature geometry on page 486. A portion of that tree is re-printed below, focusing only on the section responsible for number.



The dual number in this geometry predicts Greenberg’s (1963:94) Universal 34, that “no language has a dual unless it has a plural” because the dual relies on an “independently active” group node (Harley and Ritter 2002:493). The interpretation of dual from the features [group] and [minimal] arise from the logic that the smallest possible set [minimal] that is not singular [group] is in fact, a set of two.

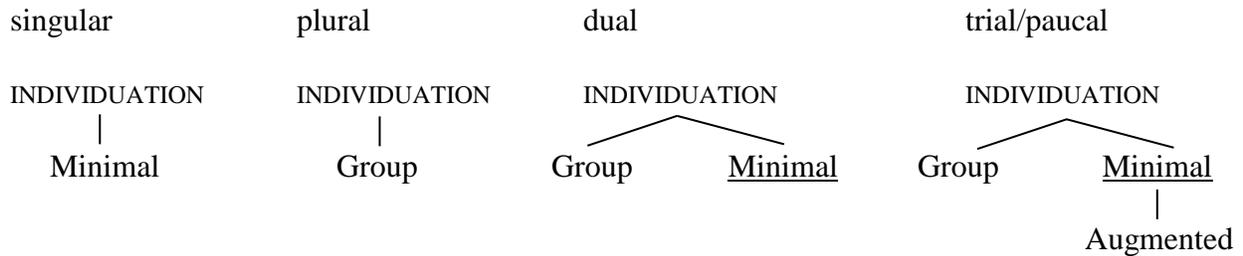
The paucal number, in the feature geometry of Harley and Ritter, is also dependent and implicational. Paucal is achieved through activation of the feature [augmented] which is a daughter of [minimal]. [augmented] can only be activated if both [group] and [minimal] are active. This is a stated feature of the geometry, but is not explicitly represented in the formalism. Also, the same logic that derives dual from [minimal] and [group] is used to derive paucal. However, this logic does not distinguish trial from paucal, as implied in Harley and Ritter (2002:494) “...the paucal consists of the smallest possible group [the dual] plus one (trial) or a few (paucal)”. It follows from this that if [minimal, group, augmented] is interpreted as a trial, then there can be no paucal, and if it is interpreted as a paucal, then there can be no trial. The

³ As pointed out in Harley and Ritter (2002) this is a common feature of earlier morphological analysis, e.g. Anderson (1992).

structure, and its ambiguity on trial and paucal numbers, predicts the absence of any number system with five distinctions.

Figure One

The four numbers of the feature geometry



We can thus interpret the structure of this system as specifically built to constrict the possible number distinctions to four, a decision that was influenced by the apparent lack of five number systems in the sources that they consulted. To quote Harley and Ritter (2002:496) “No language has more than four numbers, and so the geometry permits all and exactly the attested person and number distinctions in the world’s languages.”

3. TYPOLOGICAL DESCRIPTIONS OF NUMBER. Like theory, typological accounts of what is and is not attested in the world’s languages are constantly up for revision. New data often calls into question older ideas of what constitutes human speech. Thus, it is not surprising that a relatively recent work which focuses only on number (Corbett 2000) contradicts older typological works which include number (for example, Ingram 1978). The contradiction applies to exactly how many number distinctions are present in the world’s languages. Ingram (1978), using what data was available to him at the time, found a maximum of four number distinctions. Corbett (2000) updates the typological literature, noting the presence of five number systems in several languages in the Pacific.

3.1 Typological Four Number Maximum. Ingram (1978:227), in his typology of personal pronouns, claims that there exist only three possible number systems. These three systems are a singular and plural system, a singular, dual, and plural system, and a singular, dual, trial, and plural system. The largest of his three systems makes four number distinctions. Thus, his typology of number matches the predictions of Harley and Ritter’s featural geometry; there can be at most four distinctions between number in a single language.

Ingram describes his typology with three conceptually different types of plural. A system with only singular and plural has a more-than-one plural. A system with a dual has a more-than-two plural. A system with a trial has a more-than-three plural. Ingram uses the term “feature” to describe these types of plural, but his features are specific, rather than general. There is, for example, a specific “dual” feature, a “more-than-two” feature, and so forth. Thus, his “features” are not comparable to the features outlined in section two, which are general, universal, and which rely on the interpretation of feature combinations.

3.2 Typological Five Number Maximum. Modern works on number have recognized that a number of languages do in fact distinguish five numbers. Corbett (2000) and Cysouw (2003) are two works that attempt to describe the possible number systems of the world's languages. Corbett is probably the most comprehensive account of number to date, while Cysouw's main focus is pronominal systems and person marking, not specifically number. Nevertheless, the two works agree that the most distinctions made by any language are five, not four. These two works also discuss important issues with the trial/quadral/paucal distinction, and the geographic distribution of complex number systems (number systems with greater than three distinctions).

3.2.1 The Trial/Quadral/Paucal Problem. Both typological and theoretical accounts of number recognize not only the rarity of trials and quadrals, but also issues with their description. Corbett (2000) provides a list of four Austronesian languages that have developed a five number system; Marshallese (Micronesian, from Bender 1969), Sursurunga (South New Ireland/West Solomonic, from Hutchisson 1986), Tangga (South New Ireland/West Solomonic, from Capell 1971 and Beaumont 1976), and Lihir (New Ireland, from unpublished field data collected by Malcolm Ross). Of these four languages, only the first three are said to have a quadral.

The best descriptive data available are for Sursurunga, and it is here that Corbett makes his argument for interpreting "quadral" as paucal. For Sursurunga, there are at least four reasons why paucal may be the better label for what has traditionally been called a quadral. 1) with kinship pairs such as my four/five/six uncles, the plural is never used. In these cases, the paucal is used to indicate a minimum of four, but not a maximum. 2) quadrals are used in hortative statements that include the speaker. Here, the speaker is suggesting joint action, and the quadral is used even if the number of participants is more than four. 3) in Sursurunga the dual is used strictly for two people, regardless of the situation. According to Corbett, such a strict usage is also expected for anything that is to be considered a true quadral. 4) The trial is quite often used to refer to small groups that may consist of four participants, where one expects the quadral. Given these facts, Corbett re-analyzes the Sursurunga system from one with singular, dual, trial, quadral, and plural to one with singular, dual, lesser paucal, greater paucal, and plural. There remain five distinctions in his analysis, but the nature of those distinctions has changed considerably.

3.2.2 The Geographic Distribution of Five Number Systems. Perhaps the most relevant claim in the typological literature, from the perspective of this paper, is the limited geographic distribution of five number systems. Both Corbett (2000:25–30) and Cysouw (2003:233) claim that five number systems are found *only* in the Oceanic subgroup of Austronesian languages. Cysouw's work is more restrictive, as he claims that both four and five number systems are restricted to the "Pacific". The data examined in the remainder of this paper come from languages in northern Sarawak and East Kalimantan on the island of Borneo, located in island Southeast Asia. The complex number systems found in Borneo, discussed in detail below, discredit geographic and linguistic restrictions that state that five number systems are found only in the Oceanic subgroup, or only in the Pacific.

4. KENYAH PRONOUNS AND NUMBER. Kenyah is a group of languages that are spoken in northern Sarawak and East Kalimantan on the island of Borneo that descend from a common ancestor, known as Proto-Kenyah (PKEN). Kenyah has developed a very complex pronoun system with a distinction between inclusive and exclusive as well as five number distinctions. A

system of five numbers is reflected in separate primary branches of PKEN, which suggests that the modern system was inherited from the proto-language. Some work including lists of pronouns in various Kenyah dialects can be found in Blust (2013), which contains data for the five number system of Lepo' Sawa dialect of Long Anap, and Soriente (2013) which contains data for reduced four number systems in Lebu' Kulit and Òma Lóngh dialects.

In this section I present data on the pronouns of four Kenyah languages. For one dialect, Lebo' Vo', I give a detailed description of the pronominal system, including how the higher number pronouns are used in speech. I give an additional description of the pronouns of Uma' Pawe, a dialect which has reduced the PKEN five number system to four numbers. After presenting these data, I provide a reconstruction of the PKEN pronouns that show a five number system with 19 separate pronouns indicating inclusivity, singular, dual, trial, quadral, and plural.

4.1 LEBO' VO'. Lebo' Vo' is a Western Lowland dialect of Kenyah (Smith 2015) and is fairly divergent from the other Kenyah varieties spoken along the Baram river. The PKEN five number distinction is retained in Vo', with several important phonological innovations. In a processes of grammaticalization (discussed in greater detail in §4.4) the PMP first person plural inclusive, *kita, was paired with numerals to create dual, trial, and quadral forms in Pre-PKEN; e.g. Pre-PKEN *kita dua 'first person dual inclusive.' In PKEN, all available evidence points to a fused form, where *t from *kita replaced the first consonant of the numeral, thus, *kita dua > *tua. This fusion holds true for all of the numbers, in all modern Kenyah languages. Lebo' Vo', as spoken at Long San and Long Ikang, has expanded fusion of the pronominal and numeral elements to the second person. In PKEN, the second person plural *ikəm became associated with the numerals two through four. Using the dual again, this gave rise to the innovative form *ikəm dua 'second person dual'. Lebo' Vo' replaced the first consonant of the numeral with the *k from *ikəm, giving rise to the fused form *kui* 'second person dual.' The same pattern is found in the trial (see example 1 below). Lebo' Vo' is the only Kenyah language that has fused forms for the second person.

1)

PKEN	Lebo' Vo'
*ikəm dua	<i>kui</i>
*ikəm təlu	<i>kəlu</i>

In the third person, Lebo' Vo' typically fuses the plural pronoun with the numeral. This fusion appears only in speech, and elicited forms still produce a two word third person. The fusion pattern replaces the first consonant of the numeral with *r* from *iri* 'third person plural'. This produces the forms in the example below.

2)

PKEN	Lebo' Vo'
*ida dua	<i>iri lui ~ rui</i>
*ida təlu	<i>iri təlu ~ rəlu</i>

4.1.1 The Dual in Lebo' Vo'. From examples in texts and language experience at Long San, the dual form in Lebo' Vo' refers to exactly two people, in all contexts. The dual keeps a distinction between inclusive and exclusive. The inclusive dual refers to the speaker and to the person being

spoken to. The exclusive dual refers only to the speaker and one other person, but not the person being spoken to. In the second person, the dual is used by the speaker to address a group of exactly two people. The third person dual appears mostly in storytelling. There are several examples of the dual used in both conversation and in collected texts. Three of those examples are shown below.

3)

ame? lui ləpah tai tə uma? Michael
 1DL.EX already go to house Michael
 ‘The two of us have already gone to Michael’s house.’ (Written on a note) ML

4)

laya? wi kuman?
 good 2DL.IN eat
 ‘Shall we eat?’ ML

5)

mafo? rui pə-pəsoy
 a while 3DL RECP-talk
 ‘The two of them talked to each other for a while.’ ML

4.1.2 The Trial in Lebo’ Vo’. In texts, there are very few examples of trials being used. It is rare that one finds a need for the trial in stories about individuals. On one occasion however, while doing research at Long Palai on the upper Baram river, my consultant turned to me and one other man and uttered the following sentence,

6)

təlu tai kuman
 1TR.IN go eat
 ‘The three of us will go to eat.’ ML

From this interpretation alone, it seems that the trial is best interpreted as an actual trial. That is, a pronominal number that refers to precisely three participants. In elicitation, this is certainly true. When asked directly, speakers of Lebo’ Vo’ say that the trial means three, and refers to only three people. Groups of four or more speakers are consistently referred to with a different pronominal number, either the quadral or the plural.

4.1.3 The Quadral in Lebo’ Vo’. During elicitation sessions, pronouns formed with *pat* ‘four’ were given when plurals were requested⁴. When eliciting the first person pronouns, I typically asked for a word used for ‘we, as in the four of us’. The word given is always *təpat*. When I moved on to the next number, ‘we, as in the five of us’, *təpat* was again given as the appropriate word. Following this, I then asked, ‘we, for any amount of people’ to which *təpat* was again given as the most appropriate word. Most groups of people with four or more members are referred to with a pronoun formed with *pat*. However, it is not necessarily the case that *təpat* is

⁴ First person exclusive *ame? pat*, second person *ikəm pat*, and third person *iri pat* were elicited, but most speakers indicated that they were no longer used.

used as a plural. Another set of pronouns, which refer to large groups of people, was also elicited. This argues against a strict reading of ‘quadral’ or ‘plural’ in the modern languages. In Lebo’ Vo’ the “quadral” is actually a paucal.

An important distinction between paucal and plural is made when referring to a group of people performing the same task. For example, during elicitation the following situation was constructed: a group of people are traveling from one city to another. When the paucal is used in this situation, the sentence is interpreted as meaning that the group will be traveling in the same car, or the same boat. When the plural is used, however, the sentence is interpreted as meaning that the group is traveling in several cars or boats. Two sentences were given to show this distinction:

7)
daw vam təpat tai site
 tomorrow 1PC.IN go there
 ‘Tomorrow we will go there (using the same car).’

8)
daw vam ilu tai site
 tomorrow 1PL.IN go there
 ‘Tomorrow we will go there (using more than one car).’

4.1.4 The Plural in Lebo’ Vo’. If plurality is a designation of greater than one, then there arise numerous situations where plural pronouns may be used. In Kenyah, however, the plural is not simply ‘more than one’. Because there is a dual to refer to two people, a trial to refer to three people, and a paucal that can refer to a “small group”, the plural is quite restricted. It can only appear in stories to refer to a large group of people. In story-telling and in conversation, most groups are small and consist of two or three participants, and in Lebo’ Vo’ these are indicated by the dual and trial. One example of a true plural being used is in reference to an entire village. Kenyah villages traditionally consist of a single longhouse with as many as 200–400 individuals. From a numerical point of view, the plural is the most appropriate form for referring to an entire village. One such example is given below.

9)
itu unij wap ubən adət ame? adət ame? ləbo?
 this Uning Wap because law 1PL.EX law 1PL.EX village
 ‘This, Uning Wap, is because of our traditional laws of the village.’

4.2 UMA’ PAWE. The pronominal system of Uma’ Pawe has been reduced from the five number system found in PKEN to a four number system, with distinctions between a singular, dual, paucal, and plural. Reduction of the pronominal system targeted the quadral series; Uma’ Pawe is the only dialect used in this analysis without reflexes of PKEN *təpat, *ame? pat, *ikəm pat, and *ida pat (but see the appendix for a full list of languages that have lost the quadral). The trial has been reanalyzed as a general paucal, while the dual remained unchanged.

In reflexes of both the dual and trial forms, Uma’ Pawe reduced the two syllable pronominal and two syllable numeral to monosyllables. For example, PKEN *ame? dua ‘first

person exclusive dual', was reduced to *meʔ we*.⁵ Data used for this paper however, does not show a similar reduction in the third person, which remains disyllabic, *ira*. Example eight below demonstrates how these pronouns were reduced in Uma' Pawe.

10)	
PKEN	Uma' Pawe
*ameʔ dua	<i>meʔ we</i>
*ameʔ təlu	<i>meʔ təw</i>
*ameʔ	<i>meʔ</i>
*ikəm dua	<i>kəm we</i>
*ikəm təlu	<i>kəm təw</i>
*ikəm	<i>kəm</i>

Uma' Pawe has made another reduction to its pronouns. In the first person paucal, but not in the dual or the plural, there is no recorded distinction between inclusive and exclusive. A reflex of the PKEN first person trial exclusive, *amiʔ təlu, is found for both inclusive and exclusive. The correct glossing for Uma' Pawe *meʔ təw* is thus 'first person paucal', with no inclusive or exclusive distinction.

4.3 LEPO' TAU AND LEPO' GAH. Both Lepo' Tau and Gah are Highland Kenyah languages, and fairly conservative. There are no major innovations that distinguish the Highland pronouns from PKEN.

4.4 THE PROTO-KENYAH PRONOUNS. Reconstructing a five number system is supported by regular correspondences between the pronominal systems of languages in at least two primary subgroups, Highland and Lowland Kenyah. The languages used in this paper for reconstruction are Lebo' Vo' and Uma' Pawe (two lowland languages), and Lepo' Gah and Lepo' Tau (two highland languages). Subgrouping assumptions are based on Smith (2015). A table with reconstructed forms and evidence from modern languages is given below, followed by etymologies for each word.

⁵ The phonetic form was [duwa] with a phonetic transition glide from *u to *a. Loss of the initial syllable left only [wa]. Final *-a was regularly fronted to -e in Uma' Pawe, giving the modern form *we*.

Table One*Proto-Kenyah, Lebo' Vo', Uma' Pawe, Lepo' Gah, and Lepo' Tau pronouns.*

English	PKEN	Vo'	Pawe	Gah	Tau
1SG	*akiʔ	akeʔ	akiʔ	akeʔ	akeʔ
2SG	*ikuʔ	ikoʔ	ikuʔ	ikoʔ	ikoʔ
3SG	*ia	yɪ	ye	ya	ia
1DL.IN	*tua	wɪ	tua	tua	tua
1DL.EX	*amiʔ dua	ameʔ lui	meʔ we	ameʔ dua	ameʔ dua
2DL	*ikəm dua	kui	kəm we	kəm dua	ikəm dua
3DL	*ida dua	iri rui	ira we	ida dua	ida dua
1TR.IN	*təlu	təlu	meʔ təw	təlu	təlu
1TR.EX	*amiʔ təlu	ameʔ təlu	meʔ təw	ameʔ təlu	ameʔ təlu
2TR	*ikəm təlu	kəlu	kəm təw	kəm təlu	ikəm təlu
3TR	*ida təlu	iri təlu	ira təw	ida təlu	ida təlu
1QD.IN	*təpat	təpat		təpat	təpat
1QD.EX	*amiʔ pat	(ameʔ pat)		ameʔ pat	ameʔ pat
2QD	*ikəm pat	(ikəm pat)		kəm pat	ikəm pat
3QD	*ida pat	(iri pat)		ida pat	ida pat
1PL.IN	*ilu	ilu	iləw	ilu	ilu
1PL.EX	*amiʔ	ameʔ	amiʔ	ameʔ	ameʔ
2PL	*ikəm	ikəm	kəm	kəm	ikəm
3PL	*ida	iri	ira	ida	ida

***akiʔ ‘first person singular’.** Lebo' Vo' *akeʔ*, Uma' Pawe *akiʔ*, Lepo' Gah *akeʔ*, Lepo' Tau *akeʔ*. Support for reconstructing *akiʔ is widespread. All Kenyah languages reflect *akiʔ, which is an innovation that replaced PMP *aku. Most Kenyah languages have lowered the ultimate vowel from *i to *e*, but evidence from Uma' Pawe *akiʔ* supports reconstructing a high vowel. Reflexes of *akiʔ are found only in Kenyah languages. This is thus a highly distinctive innovation attributable to PKEN and has been used as a diagnostic in delineating the Kenyah subgroup (Smith 2015).

***ikuʔ ‘second person singular’.** Lebo' Vo' *ikoʔ*, Uma' Pawe *ikuʔ*, Lepo' Gah *ikoʔ*, Lepo' Tau *ikoʔ*. Like *akiʔ, PKEN *ikuʔ is both innovative and supported by reflexes in all Kenyah languages for which data are available. PKEN *ikuʔ replaced PMP *i-kahu. Once again, the majority of Kenyah languages have lowered the ultimate vowel, but evidence from Uma' Pawe *ikuʔ* supports the reconstruction proposed here.

***ia ‘third person singular’.** Lebo' Vo' *yɪ*, Uma' Pawe *ye*, Lepo' Gah *ya*, Lepo' Tau *ia*. This is a retention from PMP *si-ia, and requires no special attention.

***tua ‘first person dual inclusive’.** Lebo' Vo' *wɪ*, Uma' Pawe *tua*, Lepo' Gah *tua*, Lepo' Tau *tua*. This reconstruction is supported by Uma' Pawe *tua* as well as Lepo' Gah and Lepo' Tau *tua*. Lebo' Vo' has simplified the pronoun by dropping the consonant, innovating the form *wɪ*. The first person dual inclusive is best analyzed as a fusion. In Pre-PKEN, it appears that the PMP first person inclusive plural *kita formed higher number pronouns by combination with the numerals two through four. This would have given rise to the forms *kita dua, *kita təlu, and *kita əpat.

The onset of the final syllable of *kita then replaced the onset of the numeral. For the first person dual inclusive, the history can be visualized as follows: *kita dua > t+ua > *tua. This fused form was then inherited in all Kenyah languages. Note that the regular sound change PKEN *-a > Uma' Pawe *-e did not occur in *tua*. This exception remains unexplained.

***ami? dua ‘first person dual exclusive’.** Lebo' Vo' *ame? lui*, Uma' Pawe *me? we*, Lepo' Gah *ame? dua*, Lepo' Tau *ame? dua*. It is clear that PKEN had not fused the inherited pronominal with the numeral, as is the case with the inclusive series. All Kenyah languages reflect two separate words.

***ikəm dua ‘second person dual’.** Lebo' Vo' *kui*, Uma' Pawe *kəm we*, Lepo' Gah *kəm dua*, Lepo' Tau *ikəm dua*. The second person dual was also formed by associating an inherited pronominal, PMP *i-kamu, with the numerals two through four.

***ida dua ‘third person dual’.** Lebo' Vo' *iri lui*, Uma' Pawe *ira we*, Lepo' Gah, *ida dua*, Lepo' Tau *ida dua*. This is a straightforward association of PMP *si-ida ‘third person plural’ with the numeral ‘two’.

***təlu ‘first person trial inclusive’.** Lebo' Vo' *təlu*, Lepo' Gah *təlu*, Lepo' Tau *təlu*. Although the modern form is homophonous with the numeral three in all Kenyah languages that reflect *təlu, comparative evidence suggests that the first person trial inclusive formed through a fusion of PMP *kita with the numeral *təlu ‘three’. If the formula for generating the first person dual inclusive is applied to the trial, the result in PKEN *təlu. Start with the pronominal plus the numeral, *kita təlu. Take the onset of the final syllable of the pronominal, *t, and use it to replace the onset of the numeral. Thus *kita təlu > *t+əlu > *təlu.

***ami? təlu ‘first person trial exclusive’.** Lebo? Vo? *ame? təlu*, Uma' Pawe *me? təw* ‘first person paucal’, Lepo' Gah *ame? təlu*, Lepo' Tau *ame? təlu*.

***ikəm təlu ‘second person trial’** Lebo' Vo' *kəlu*, Uma? Pawe *kəm təw* ‘second person paucal’, Lepo' Gah *kəm təlu*, Lepo' Tau *ikəm təlu*.

***ida təlu ‘third person trial’.** Lebo' Vo' *iri təlu*, Uma' Pawe *ire təw* ‘third person paucal’, Lepo' Gah *ida təlu*, Lepo' Tau *ida təlu*.

***təpat ‘first person inclusive quadral’.** Lebo' Vo' *təpat*, Lepo' Gah *təpat*, Lepo' Tau *təpat*. If we apply the same formula used to form the PKEN first person dual and trial inclusive pronouns to the quadral, we can derive the form *təpat from Pre-PKEN *kita əpat. Take the onset of the final syllable of the pronominal, *t, and use it to replace the onset of the numeral (or if no onset is present, simply prefix *t to the numeral). Thus, *kita əpat > *t+əpat > *təpat. A reflex of *təpat is found in all Kenyah languages with the exception of Uma? Pawe, which has lost the quadral completely.

***ami? pat ‘first person exclusive quadral’.** Lebo' Vo' *ame? pat*, Lepo' Gah *ame? pat*, Lepo' Tau *ame? pat*.

***ikəm pat ‘second person quadral’.** Lebo’ Vo’ *ikəm pat*, Lepo’ Gah *kəm pat*, Lepo’ Tau *ikəm pat*.

***ida pat ‘third person quadral’.** Lebo’ Vo’ *iri pat*, Lebo’ Gah *ida pat*, Lepo’ Tau *ida pat*.

***ilu ‘first person plural inclusive’.** Lebo’ Vo’ *ilu*, Uma’ Pawe *iləw*, Lepo’ Gah *ilu*, Lepo’ Tau *ilu*. This is an innovative form, and is found in several Kenyah dialects including all dialects used for this paper. It does not seem to be derived from a pronoun + numeral, and its history remains obscure. Nevertheless, it must be reconstructed to PKEN.

***ami? ‘first person plural exclusive’.** Lebo’ Vo’ *ame?*, Uma’ Pawe *ami?* Lepo’ Gah *ame?*, Lepo’ Tau *ame?*. The pronominal **ame?* appears in all first person exclusive pronouns. When alone, it indicates the plural, but when paired with numerals, it has either a dual, trial, or quadral interpretation. If **ame?* reflects PMP *i-(k)ami*, then one must explain the innovation of a word final glottal stop. Sporadic word final glottal stop insertion is an areal feature of much of the island of Borneo. Iban, Brunei Malay, Kayan, Modang, Segai, Tunjung, Berawan, Penan, Sebop, Ngorek, and Kenyah all have varying degrees of word final glottal stop insertion or deletion. Because of this, the appearance of final glottal stop in this pronoun is not as troubling as one might think. The lowering of **i* in PKEN **ami?* > Uma’ Pawe *me?* is unexpected. Uma’ Pawe does not lower high vowels in closed syllables.

***ikəm ‘second person plural’.** Lebo’ Vo’ *ikəm*, Uma’ Pawe *kəm*, Lepo’ Gah *kəm*, Lepo’ Tau *ikəm*. Although PKEN **ikəm* is quite similar to PMP **i-kamu*, there are two inexplicable exceptions in the sound correspondences. Both PNS **a* and **u* were inherited unchanged in PKEN. Loss of final **-u* and raising of **a* are unexpected. It is likely that when the prefix **i-* was fossilized to the base, giving Pre-PKEN **ikamu*, that the final vowel was deleted due to internal pressures which favor a two syllable canonical word. Raising of **a* to **ə* however, must remain an unexplained irregular sound change.

***ida ‘third person plural’.** Lebo’ Vo’ *iri*, Uma’ Pawe *ira*, Lepo’ Gah *ida*, Lepo’ Tau *ida*. This is a retention of the PMP third person plural, **si-ida* and requires no special attention. Note, however, that Uma’ Pawe again failed to raise word final *-a* to *-e*.

4.5 Reconstructing Quadral. In the data used for this paper, there is not enough descriptive material to make a definitive choice between quadral or paucal as the most appropriate gloss for PKEN pronouns formed with **pat*. In Lebo’ Vo’ it seems that paucal is the correct choice. Blust (2013:318) offers pronominal data from the Kenyah variety spoken at Long Anap where the label ‘quadral’ was used for pronouns formed with *pat*. Because of that, the gloss quadral was chosen for reconstruction in the above section. However, Corbett (2000:26–30) notes that where detailed descriptions are available, ‘quadral’ are best analyzed as ‘paucal’. The Kenyah data is no exception. Only word lists and a few sentences are available for most dialects of Kenyah. However, because I was able to spend several weeks at Long San, I had the opportunity to perform a more in-depth analysis and decided on paucal for Lebo’ Vo’.

5. NUMBER SYSTEMS IN LANGUAGES OF BORNEO. Complex number systems have developed in several languages of Borneo. This seems to be part of a linguistic area that covers

most of northern Sarawak and East Kalimantan. Some of those languages are described below, and include Kayan, Kiput, Kelabit, and Sa’ban. Kelabit and Kiput are found in separate branches of North Sarawak. Kenyah languages also belong in this subgroup, but Kayanic languages apparently do not (Blust 2010, Smith 2015).

5.1 Kayan. Kayanic languages show four numbers in their pronoun systems. The Kayan spoken at Long Naah is typical of Kayan languages in general (see table two). The Kayan system is notable for its large number of fused forms. In many cases, duals and trials are not easily analyzable as a pronoun and a grammaticalized numeral. Dual forms, with the exception of *ito?* ‘first person dual inclusive’ reflect the final syllable of *dua as *wa?* plus the first consonant and final vowel of the plural pronoun. Thus *kita dua > k+a+wa? > *kawa?* ‘first person dual exclusive’.

One might propose that this formula affected all pronouns, but it only holds true for first person exclusive dual and trial, second person dual, and third person dual and trial. The formula fails for second person trial, where **kulo? is predicted, and for all first person inclusive forms.

Table Two

Kayan pronouns

English	Kayan, Long Naah			
	singular	dual	trial	plural
1IN	akoy	ito?	təlo?	itam lim
1EX		kawa?	kalo?	kame?
2	ika?	kuwa?	kəlo?	ikam
3	iha?	dawa?	dalo?	daha?

5.2 Kiput. Kiput is a Lower-Baram language, and exhibits a four number system. Data here is from Blust (2003). The pronoun section in this work is limited. It was never intended to be a thorough description of the language. It does, however, provide clear evidence that Kiput has at least a singular, dual, trial, and plural. Whether or not the trial may be analyzed as a paucal remains to be seen. The full pronoun set is shown below in table three.

Table Three

Kiput pronouns

English	Kiput			
	singular	dual	trial	plural
1IN	kaw	kifih	killaw	kiteh
1EX		kafih	kallaw	kamay
2	naw	ifih	illaw	uñew
3	ñih	difih	lew	idih

5.3 Kelabit. Data below is from the Bario dialect of Kelabit as presented in Blust (2013). Again, the work where these data were published was not a description of Kelabit, so information on how these forms are used in sentences is limited. Like Kiput and Kayan, however, Kelabit (in table four) shows a clear four number system, regardless of how those numbers are interpreted.

Table Four
Kelabit pronouns

English	Kelabit			
	singular	dual	trial	plural
1IN	uih	kitəh	təluh	tauh
1EX		kədiwəh	kətəluh	kamih
2SG	iko	məduəh	mətəluh	muyuh
3SG	iəh	diwəh	dətəluh	idəh

5.4 Sa’ban. Sa’ban is a highly divergent member of the Kelabit-Lun Dayeh group of North Sarawak. Rapid sound change has left many of the pronouns unrecognizable (compare the Sa’ban forms in table five to the Kelabit forms in table four). Its pronominal system is complex, and needs to be sorted out with care. Of special interest is the trial and paucal series. There are two trials, formed from the number three, *məlaw* ‘first person trial exclusive’ and *kalaw* ‘second person trial’. Blust (n.d.) explicitly points out that there is no trial for the first person inclusive. There is, however, a paucal. Interestingly, the paucal in Sa’ban is formed with the number ‘four’, which indicates that Sa’ban had, at one time, a fully functional five number system like that found in Kenyah. The third person also has a paucal rather than a trial, but the third person paucal is formed with the numeral three, not four. Blust (n.d.) also has a second person paucal listed as identical to the third person paucal. If this is accurate, then Sa’ban also holds the distinction of being one of a *very* small number of languages that have a second-person/third-person pronoun. The full set is given below in Table five.

Table Five
Sa’ban pronouns

English	Sa’ban				
	singular	dual	trial	paucal	plural
1IN	ek	təh	təh pat		təm
1EX		aməw	məlaw		aməy
2SG	cəh	keəh	kalaw	dəlaw	ciəm
3SG	yəh	deəh	dəlaw		dəh

It seems clear that Sa’ban had at one time a five number system. There was a trial series formed with ‘three’, and a quadral/paucal series formed with ‘four’. Sa’ban reduced this system in an asymmetrical fashion, and replaced the first person trial inclusive with the paucal, but lost the paucal everywhere else. This change parallels Lebo’ Vo’ Kenyah, where the first person inclusive paucal is the only paucal in regular use.

The evidence for a northern Sarawak East Kalimantan linguistic area that has affected number systems in several languages is quite strong. Evidence from several North Sarawak languages and from Kayan show independent innovations of complex number systems in Borneo. Even more languages are listed in the appendix, showing the number of pronominal distinctions and their type (singular, dual, trial, quadral, paucal, or plural). Because there are distinct trials and paucals in Blust (n.d.), Sa’ban is listed in the appendix as having four *or* five numbers, pending further investigation.

6. DEVELOPMENT AND EVOLUTION OF COMPLEX NUMBER. Cysouw (2003:236) examines the case of Bolaang Mongondow, spoken on Sulawesi. In this language, a set of “determined” pronouns can be paired with a numeral, giving a reading somewhat similar to English “the three of us” or “the four of you”. Here, the higher number “pronouns” are not pronouns at all, but simply reflexes of the PMP plural and a number. It is not a restricted set, and forms like “the fourteen of us” or “the thirty of you” are theoretically possible. One must then ask if the higher number pronouns in Kenyah are similarly formed by adding a numeral to the pronouns.

To this question, the answer is straightforwardly no. There are two reasons why this reading is inappropriate for the Kenyah data. First, the higher number pronouns in Kenyah are a closed set. Numbers higher than four cannot be added to the pronouns. While eliciting data on Kenyah languages, I naturally asked questions like the following, “If I can say *ida dua* for two people, *ida tǎlu* for three people, and *ida pat* for four people, can I say *ida lǎma* for five people?” The response to this question was an emphatic no, in all dialects. The pronouns in Kenyah are not formed by the synchronic adding of numerals to pronominal bases.

Second, while many of the higher number pronouns are formed with two clear historical components, the first person inclusive set can be reconstructed to PKEN as a single morpheme without any analyzable morpheme boundary. Thus, even if one were to analyze **ame? pat* ‘first person exclusive quadral’ as a pronoun plus number, the same cannot be done for **tǎpat* ‘first person inclusive quadral’, which is a single word with no morpheme boundary. The Lebo’ Vo’ dialect has innovated single morpheme forms in the second person as well, and in speech the third person is also showing signs of fusing into a single morpheme (§4.1). This dialect in particular strongly resists any analysis that would seek to write off higher number pronouns as simple pronouns plus a specifying number.

Another question which arises from Cysouw’s observation is whether the PKEN higher number pronouns might have arisen through grammaticalization. In the Bolaang Mongondow example, Cysouw hypothesized that the pronoun + numeral strategy will eventually lead to grammaticalized forms with elements of the number three. What Cysouw proposed for Bolaang Mongondow may have already happened in Kenyah. It is fairly obvious from the PKEN reconstructions that the higher number pronouns did in fact arise through a pronoun + number strategy that became grammaticalized in forms like **tua*, **tǎlu*, and **tǎpat*. Forms that did not fuse into a single morpheme, like **ame? dua* ‘second person dual exclusive’, nevertheless became semantically and lexically “grammaticalized” as single pronouns.

We can make a further inference on the evolution of complex number systems from observing how the five number PKEN pronouns were reduced in Uma’ Pawe, and other dialects. Firstly, although the PKEN ‘quadral’ was formed from the numeral **pat* ‘four’, the only Kenyah language with a thorough description of number utilizes this series as a paucal. It’s already been noted that the existence of quadral numbers have been called into question. If PKEN truly had a quadral, it has not survived as such in Lebo’ Vo’. Thus, quadrals are highly marked and prone to simplification, or shift to paucal. Second, In the Uma’ Pawe dialect, not only was the ‘quadral’ lost, the entire set of pronouns formed with **pat* were lost. The result was a reduction in number distinctions from five to four. This allows us to infer that five number systems are marked, and are likely to reduce in number, by deletion of the higher numbers. In Uma’ Pawe, the quadral was deleted, but in other languages, the inherited plural is sometimes deleted, and the next highest number shifts to take its place. The Badeng dialect of Kenyah spoken at Lio’ Match has lost the inherited plural and the quadral has shifted to a plural (see example 11 below). In

Badeng, the first person plural inclusive is *təpat*. Data collected at Lio' Matoh is limited however, and needs elaboration. Blust (n.d.) lists *tepat* as a replacement plural in at least Long Atun and Long Jeeh Kenyah as well.

11)	
1PL.IN	<i>təpat</i>
1PL.EX	<i>ameʔ pat</i>
2PL	<i>ikəm pat</i>
3PL	<i>eda pat</i>

Blust (2013:318) gives another example of this phenomenon in Melanau (Mukah), a language of Borneo with a three number system (singular, dual, plural) that is not closely related to Kenyah. In Melanau, the dual series was formed by a fusion of PMP plural forms with the numeral *dua, much like the inclusive dual *tua in PKEN. The plural series in the Mukah dialect (but not in all dialects of Melanau), is formed from a past trial, and bears a fused reflex of PMP *təlu 'three' (see example 12 below).

12)	
1PL.IN	<i>tələw</i>
1PL.EX	<i>mələw</i>
2PL	<i>kələw</i>
3PL	<i>(də)ləw</i>

It appears that Melanau had at one point a four number system, with a trial or paucal formed from the number three. Over time, the marked four number system reduced to a three number system. This reduction, as predicted, targeted the higher numerals. Interestingly, however, the inherited plurals were lost, and replaced with the innovated trials.⁶

One must eventually ask why inherited plural pronouns, with unambiguous plural meanings, were replaced by pronouns formed with 'four' or 'three'. A possible answer to this question has been alluded to in previous sections. In a two number system, with singular and plural only, plural will refer to any number of people greater than one. Most conversations take place between a very small group of people, and in many cases, between only two people. Because of this plural pronouns in a five number system are rarely used. In a conversation between two people, the plural will be used. In a conversation between a small group, the trial or paucal (or quadral) will be used. Because the trial or paucal pronouns are used in the majority of cases where more than two people are being addressed, they will eventually come to replace the underutilized plural. This is the most likely reason why one finds plural pronouns formed with the numbers four and three in Borneo and in the Pacific.

Complex number systems can be viewed as arising through grammaticalization of numerals with pronouns. This grammaticalization can sometimes produce strikingly large pronoun systems. These overly-complex systems are unstable, and prone to reduction. Reduction targets the semantics, by shifting trial and quadral forms to paucal, then it targets the numbers themselves, reducing five number systems to four number systems, and further reducing four

⁶ A similar change happened in many Polynesian languages. Hawaiian, for example has *kā-kou* 'first person inclusive plural', which is formed from the numeral three, (in the pronouns, Proto Polynesian *tolu 'three' > *kolu > *kou*)

number systems to three number systems. There is no evidence, however, that three number systems were ever further reduced to two number systems in Borneo. When complex number systems are reduced, it is the higher numbers (paucal and plural) that are lost. It is likely, then, that complex number systems have come and gone in many of the world's languages. They have only appeared in Borneo in the last one or two millennia, and are already being reduced and simplified.

7. CONCLUSION. The sections above support a strong argument that typological studies of number, which have recognized five number systems only in languages of the Oceanic subgroup, are in need of revision. Five number systems have developed independently in Borneo, separated both geographically and linguistically from Oceanic languages. A five number system is found in several closely related languages and can be reconstructed to PKEN. It remains true, however, that five number systems are found exclusively in the Austronesian family.⁷ There is no evidence that large number distinctions are inherited, rather, innovations of three, four, and five number systems has taken place independently in a number of languages.

Furthermore, the area of Borneo occupied by North Sarawak, Melanau-Kajang, and Kayanic languages represents a linguistic area where the innovation of complex number systems has flourished in recent history. A number of languages in this area have four number systems, while most of the four number examples in Corbett (2000) are again from the Pacific.

Innovation of higher number pronouns can be fairly readily explained for the dual. It likely arose as a product of one on one conversations. This explains why in many Philippine languages, dual forms were innovated in the first person only (Liao 2008). In Borneo and in the Pacific, different events led to innovation of complex number systems in very different environments. In order to understand how such number systems are innovated, we must begin with a more complete picture of exactly where these systems are found.

Theoretical accounts of number are by their nature restrictive. The goal of theory is to propose a system that generates exactly what is found in the world's languages and nothing more. As more data is gathered, it has become clear that theories of number, and specifically the feature geometry of Harley and Ritter, are in need of revision. The feature geometry is too restrictive and does not allow for attested number systems. In the past, researchers were able to claim that five number systems occurred in only a handful of languages, in a geographically restricted area, and with poor documentation. This no longer seems to be the case. There are numerous examples, from the Kenyah group of languages in Borneo, that five number systems are not geographically restricted, nor are they poorly documented.

In order to reconcile the feature geometry of Harley and Ritter with new evidence of five number systems, it is necessary to adjust the proposed structure. Harley and Ritter (2002:494) left open this possibility in a footnote where they state (referring to a fifth number) "The existence of such systems could be accommodated in our framework by the addition of a node, probably as a dependent of Group." It is possible to add such a node, and to theorize how a restricted group may better represent a true paucal than [group, minimal, augmented].

⁷ The significance of this restriction is debatable. There are around 1,200 Austronesian languages, comprising one fifth to one sixth of the world's languages. The restriction of five number systems to Austronesian is likely due to the fact that there are so few languages with five number systems, compared with so many Austronesian languages. The restriction of five number systems to Austronesian is best explained as due to chance, rather than as some abstract property specific to the family.

An inadequacy of the Harley and Ritter model is that it does not distinguish between trial and paucal. The addition of features that are dependent on minimal will always contain the restriction of “smallest possible set”. This inference arises from their treatment of the dual, discussed above as the smallest possible set [minimal] that is not singular [group]. Thus, having [augmented] be a dependent of [minimal] suggests that [group, minimal, augmented] should be interpreted as a trial, which is the smallest possible set larger than two, and not as a paucal. In order to generate a paucal, the geometry needs a restricted group. That is, a group of people that has an approximate range, more than the trial but not plural. This can be achieved by the feature [restricted], under the node [group]. Thus, paucal is an interaction of the features [group, restricted] while trial is an interaction of [group, minimal, augmented].

APPENDIX

Central Borneo is home to a linguistic area where complex pronominal number systems have developed independently in a number of languages. The following list indicates which languages in this area have developed number systems of three or more. Note also that all of the languages in this list have a distinction between inclusive and exclusive. Several subgroups are present below, including Kayan-Murik (K-M), Kelabit-Lun Dayeh (K-LD), Berawan-Lower Baram (B-LB), Bintulu (B), Kenyah (K), Melanau-Kajang (M-K), and Dusunic (D). Of these groups, K-LD, B-LB, B, and K form a still larger group, North Sarawak. There is no evidence, however, that higher number systems in these languages are inherited from Proto-North Sarawak. Some languages show evidence of past number distinctions, now lost. For example, the plurals in Badeng Kenyah are from a past quadral. These are marked in the list below. Kenyah, Kayan, and Ngorek number information is from Smith (n.d.). Òma Lóngh and Lebu’ Kulit Kenyah are from Soriente (2013). All others are from Blust (n.d.).

Kenyah, Lebo’ Vo’ (K)	Five numbers. singular, dual, trial, paucal (from a quadral), plural.
Kenyah, Lepo’ Sawa (K)	Five numbers. singular, dual, trial, quadral(?), plural.
Kenyah, Lepo’ Tau (K)	Five numbers. singular, dual, trial, paucal(?), plural.
Kenyah, Lepo’ Gah (K)	Five numbers. singular, dual, trial, paucal(?), plural.
Sa’ban (K-LD)	Four/five numbers. singular, dual, trial, paucal (from a quadral), plural
Berawan (B-LB)	Four numbers. singular, dual, trial, plural.
Bisaya (D)	Four numbers. singular, dual, trial, plural.
Kayan (K-M)	Four numbers. singular, dual, trial, plural.
Kelabit, Bario (K-LD)	Four numbers. singular, dual, trial, plural.

Kenyah, Badeng (K)	Four numbers. singular, dual, trial, plural (from a quadral)
Kenyah, Lebu' Kulit (K)	Four numbers. singular, dual, paucal (from a trial), plural.
Kenyah Òma Lóngh (K)	Four numbers. singular, dual, paucal (from a trial), plural.
Kenyah, Uma' Pawe (K)	Four numbers. singular, dual, paucal (from a trial), plural.
Kiput (B-LB)	Four numbers. singular, dual, trial, plural
Ngorek (K-M)	Four numbers. singular, dual, paucal (from a trial), plural.
Penan, Long Labid (K)	Four numbers. singular, dual, trial, plural.
Sarikei (M-K)	Four numbers. singular, dual, trial, plural.
Tring (K-LD)	Four numbers. singular, dual, trial, plural.
Bintulu (B)	Three numbers. singular, dual, plural (from a trial).
Dalat (M-K)	Three numbers. singular, dual, plural (from a trial)
Matu (M-K)	Three numbers. singular, dual, plural (from a trial)
Melanau (M-K)	Three numbers. singular, dual, plural (from a trial)
Narum (B-LB)	Three numbers. singular, dual (incomplete dual), plural.
Penan, Long Merigam (K)	Three numbers. singular, dual, plural (from a trial).
Sebop (K)	Three numbers. singular, dual, plural (second person from a trial).

REFERENCES

- Adger, David. 2003. *Core Syntax: a Minimalist approach*. Oxford: Oxford University Press.
- Anderson, Stephen R. 1992. *A-morphous morphology*. Cambridge: Cambridge University Press.
- Beaumont, Clive H. 1976. Austronesian languages: New Ireland. In *Austronesian languages: New Guinea area languages and language study II* ed. by Stephen A. Wurm. 387–397. Canberra: Pacific Linguistics.
- Bender, Byron W. 1969. *Spoken Marshallese: an intensive language course with grammatical notes and glossary*. Honolulu: University of Hawai'i Press.
- Blust, Robert. 1974. The Proto-North Sarawak vowel deletion hypothesis. PhD diss., University of Hawai'i.

- Blust, Robert. 2003. *A short morphology, phonology and vocabulary of Kiput, Sarawak*. Canberra: Pacific Linguistics.
- Blust, Robert. 2013 [2009]. *The Austronesian languages*. Canberra: Asia-Pacific Linguistics Research School of Pacific and Asian Studies The Australian National University.
- Blust, Robert. n.d. Fieldnotes on 41 languages of northern and central Sarawak.
- Capell, Arthur. 1971. The Austronesian languages of Australian New Guinea. In., *Current trends in linguistics VIII: linguistics in Oceania* ed. by Thomas A. Sebeok. 240–340. The Hague: Mouton.
- Clements, George N. 1985. The geometry of phonological features. *Phonology Yearbook 2*: 225–252
- Corbett, Greville. 2000. *Number*. Cambridge: Cambridge University Press.
- Cysouw, Michael. 2003. *The paradigmatic structure of person marking*. Oxford Studies in Typology and Linguistic Theory. Oxford: Oxford University Press.
- Harley, Heidi and Elizabeth Ritter. 2002. Person and number in pronouns: A feature-geometric analysis. *Language* 78(3): 482–526.
- Hutchisson, Don. 1986. Sursurunga pronouns and the special use of quadral number. In *Pronominal systems* ed. by Ursula Wiesemann. 217–255. Tübingen: Narr.
- Ingram, David. 1978. Typology and universals of personal pronouns. In *Universals of human language* Vol. 3 ed. by Joseph H. Greenberg. 213–247. Stanford: Stanford University Press.
- Liao, Hsiu-Chuan. 2008. A typology of first person dual pronouns and their reconstructibility in Philippine languages. *Oceanic Linguistics* 47: 1–29.
- Smith, Alexander D. 2015. On the classification of Kenyah and Kayanic languages. *Oceanic Linguistics* 54(2): 333–357.
- Smith, Alexander D. n.d. Fieldwork undertaken in Sarawak on Kenyah and Kayanic languages.
- Soriente, Antonia. 2013. Undergoer voice in Borneo Penan, Punan, Kenyah, and Kayan languages. In *Voice variation in Austronesian languages: Linguistic studies of Indonesian and other languages in Indonesia* ed. by K. Alexander Adelaar, NUSA 54: 175–203.